Note.—The application for a Patent has become void.

This print shows the Specification as it became open to public inspection on Oct. 2, 1933, under Section 91 (4) (a) of the Patents and Designs Acts, 1907 to 1932.

PATENT SPECIFICATION

422,184

Application date: April 3, 1933. No. 10013/33.

Complete Specification not Accepted

COMPLETE SPECIFICATION

System of Driving Conveyor or other Chains

I, LOUIS GRANGES, a citizen of the French Republic, of 145, Rue du Faubourg, Saint Renis, Paris, in the Republic of France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of this invention is a system of driving conveyor or other chains.

It is known that when a chain, particularly a chain of long pitch, is driven by a wheel having a uniform angular velocity, variations in speed are caused in the driven chain. These variations of speed give rise to serious disadvantages, especially for conveyors, escalators, bucket conveyors etc.

A certain number of arrangements are known tending to obtain a uniform speed of the chain, either by acting mechanically on the teeth of the wheel or by giving an appropriate variable angular velocity to the driving wheel. These arrangements have the disadvantage due to the inertia of the wheels or of the elements comprising them, and in addition, do not appear to have ensured the arrival, without a noisy shock, of the chain spindles in the teeth of the wheel.

The system according to the invention which overcomes these disadvantages is more particularly characterised by a wheel or group of wheels having a uniform angular velocity, characterised by a guide track for the chain which presents, in the vinicity of the driving wheel, a curved sinuous or otherwise shaped part, whose extended length is suitably greater than the projection of the said part on to the straight line trajectory of the chain, the guide rollers of the chain being constrained to follow the said curved or sinuous track with the object of ensuring the equality of the ratio of a length of arc passed through by an axle of the chain in contact with the wheel to the arc contained between two successive axles of the chain on this wheel and the corresponding ratio of displacement of an axle of the driven chain to the pitch of the chain.

This system makes it possible to obtain:—

1. For a uniform angular velocity of the wheel, a uniform velocity of the chain without the addition o fmechanical movements.

2. An entry into contact without shock, that is to say without noise, of the chain pin and the tooth of the wheel, at the same time as a bearing of the chain pin on the tooth of the wheel having a progressive intensity.

The attached drawing shows a constructional form of an arrangement of the system in accordance with the invention.

The single drawing is a general elevation.

The roller chain comprises the links 1, the axles or pins 2, the rollers 3 turning on the axles 2. The rollers 3 roll on a rail 4 which itself is fixed on the supports 5.

A flexible rail 6 is fixed to the extremity of the rail 4.

A wheel 7 carries the teeth 8 on which the chain rolls.

The line 9 indicates the track along which pass the centres of the axles 2.

The dotted line 10 represents the top of the flexible rail 6 when this rail is not supporting any load.

The axles 2, 2_1 and 2_2 correspond respectively to the rollers 3, 3_1, 3_2 indicated to explain the functioning.

The points c, c_1, c_2, c_3 are the centres of the axles 2, 2_1, 2_2, 2_3.

The points d, d_1, d_2, d_3, d_4, d_5 are equal divisions between c and c_1.

The points c_2 and c_3 are the centres of the two axles 2_2 and 2_3 engaging with the neighbouring teeth 8 of the wheel 7.

The points a, a_1, a_2, a_3, a_4, a_5 are equal divisions between c_2 and c_3.

[*Price* 1/-]

Price 4s 6d

The circle 3_4 in a dash and dot line represents one of the positions of the roller 3_2 at the moment when it is leaving the rail 6.

For a uniform angular velocity of the wheel 7 the uniform movement of the chain is obtained, as will be explained, by that part of the device which assures the uniform speed.

Taking the position of the parts at the instant where they are shown in the drawing, that is to say at the point where the axle 2_2 is coming into contact with a tooth 8 of the wheel 7, it will be seen that the centre c_2 will pass along the arc c_2—c_3 corresponding to the pitch of the chain, passing successively through the equal arcs $a, a_1 \ldots a_4, a_5$ in equal successive times, as the angular velocity of the wheel 7 is uniform.

On the other hand, if the pitch of the chain c, c_1 is considered it will be seen that for a uniform speed of the chain the centre c should pass successively through the equal distances $d, d_1 \ldots d_4, d_5$ in equal intervals of time.

It will be seen that if the spaces corresponding to a pitch of the chain c, c_1 and c_2, c_3 are passed through respectively by the centres c and c_2 in such a manner that these centres c and c_2 pass respectively and simultaneously through the points $d, a, d_1, a_1 \ldots d_5, a_5$ a uniform velocity of the chain will be obtained if that of the wheel is uniform.

The arc c_2—c_3, however, has a greater length than the pitch of chain c—c_1 and, on the other hand, if the centres o, c_2 are directly connected at every point of the track passed through by the centre c_2, the velocity of the centre c would be different, thus causing accelerations or retardations of variable intensity in the driven chain, indicating wrong functioning and a considerable supplementary, effort in the chains owing to the accelerations.

If a centre c_1 is allowed to become displaced between the centres c and c_2, outside a straight line connecting c, c_2, a shortening of the distance c, c_2 will thus be obtained if c_1 moves away, and a lengthening of this distance if it moves nearer.

It will be seen from the foregoing that by this appropriate displacement of the centre c_1 during the path c_1, c_2 through which it passes while the axle 2_2 goes from c_2 to c_3 and the axle 2 from c to c_1, it can be arranged that at each passage of the points $a \ldots a_5$ by the axle c_2, the centre c passes simultaneously through the points $d \ldots d_5$.

In order to make the above explanation still more clear it may be said that the positions taken up successively by the centre c will be determined by the intersection of the arcs having a radius equal to the pitch of the chain, described from the points $c, c_2, d, a, d_1, a_1 \ldots d_5, a_5$. On the attached drawing the points $t \ldots t_5$ are thus shown.

These arcs intersect at two points, and preferably that one is chosen which is situated below the straight line which connects the pins 2 and 2_2 in such a way that the component determined by the tension of the chain tends to keep the roller 3_1 on the rail 4.

The preceding description refers to an application to a certain pitch, but for pitches of greater length and the same number of teeth on the wheel it may be necessary in certain cases to resort to the displacement of several pins 2 under the same conditions as described above, in order to obtain the desired result.

In order that the pin and the tooth of the wheel shall make contact without shock, the chain is kept in its direction by the rollers 3 rolling on a rail 4. This rail 4 fixed on the supports 5, is curved in in such a way as to remain parallel to the line 9 which marks the track of the centres of the chain axles.

The track 4 is furnished with a flexible rail 6 at the end nearest to the wheel 7.

If the roller 3_1 is caused to traverse the distance c_1, c_2, it will be seen that the roller passes over the curved part of the rail 4, and leaves the end of this rail to continue rolling on the flexible rail 6, causing this to bend under the action of the component of force on the axle 2_2 due to the tension of the chain and the position of this axle 2_2 situated above the straight line joining the points c_1, c_2.

In addition, the shape and the flexibility of the rail 6 are suitably chosen so that the line 9 merges in the neighbourhood of the point c_2 with the pitch circle of the teeth 8 of the wheel 7.

It will thus be seen that, owing to the roller 3 and the rail 6, the axle of the pin 2_2 comes into contact with the tooth of the wheel when they both have the same velocity and the same direction.

It will also be seen that at the moment of contact of the pin 2_2 with the tooth, the rail 6 supports the full force of the component indicated above, the bearing of the pin 2_2 on the tooth thus taking place without pressure, the pressure of this bearing then increasing as the roller 3 advances along the rail 6 until the roller occupies a position near 3_4, a position in which the rail 6, having had all its elasticity utilised, is liberated from the roller 3.

This coming into contact without shock of the chain pins with the teeth of the

wheel, and the progressive increase in the bearing pressure, offer the great advantage that noise and wear of the pins is avoided as well as of the teeth of the wheel.

Although it has not been shown in the drawing, it will be realised that the flexible rail 6 may be furnished with a device for adjusting its height at the point 10, in order that its flexibility at this point may correspond exactly with the tangential arrival of the axle of the chain pin at the pitch circle of the wheel.

The invention can be applied to chains used for driving apparatus such as conveyors, mechanical escalators, bucket conveyors etc.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A system of driving a conveyor or other chain, driven by a wheel or group of wheels having a uniform angular velocity, characterised by a guide track for the chain, presenting, in the vinicity of the driving wheel, a curved, sinuous, or otherwise shaped part, whose extended length is suitably greater than the projection of the said part on to the straight line trajectory of the chain, the guide rollers of the chain being constrained to follow the said curved or sinuous track with the object of ensuring the equality of the ratio of a length of arc passed through by an axle of the chain in contact with the wheel to the arc contained between two successive axles of the chain on this wheel, and the corresponding ratio of displacement of an axle of the driven chain to the pitch of the chain.

2. A constructional form of an arrangement for realising the system described in 1, according to which the shape of the guide track is obtained by points determined by the intersections of arcs of circle having for radius the pitch of the chain and described from corresponding points as centres situated respectively on the end of the rectilinear trajectory and on the commencement of the circular trajectory of the centres of the chain pins.

3. Arrangement as in 2, permitting the chain pins to come into contact with the teeth of the wheel without shock, and with a bearing intensity of the pin on the tooth which is zero at the moment of contact and increases progressively, characterised in that a flexible rail, with or without a device for adjusting its position, causes each chain pin to arrive successively at the corresponding tooth of the wheel, this flexible rail equalising at this moment the normal component, the elasticity of this rail and its shape permitting the chain pin to come into contact with the tooth with an intensity which increases until the flexible rail is completely relieved of load.

Dated this 3rd day of April, 1933.

Sgd.
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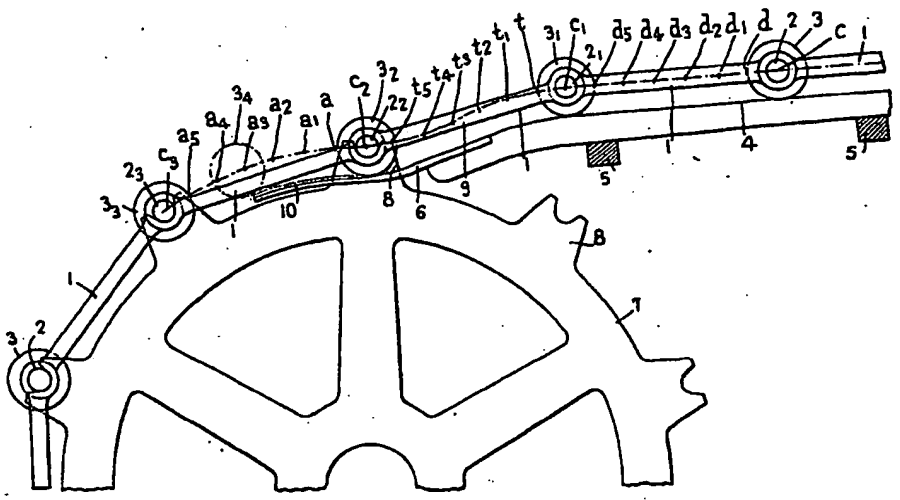

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